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3M INNOVATIVE PROPERTIES COMPANY PO BOX 33427 ST. PAUL, MN 55133-3427				
EXAMINER				
KOLLAS, ALEXANDER C				
ART UNIT		PAPER NUMBER		
1796				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

LegalUSDocketing@mmm.com
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Office Action Summary

Application No.

10/596,722

Applicant(s)

HOESCHELER ET AL.

Examiner

ALEXANDER C. KOLLIAS

Art Unit

1796

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19-39 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 19-39 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SI/IC)
Paper No(s)/Mail Date 20070326, 20070420
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____

DETAILED ACTION

Information Disclosure Statement

1. Regarding the IDS filed 4/20/2007, the reference DD 258 321 appears to be misspelled and should be "DE 258321". However, as neither an English language equivalent nor English language abstract was not provided the reference was not considered.

Claim Objections

2. Claim 22 is objected to because of the following informalities: Claim 22, Line 2 recites "not over 2 mol" which appears to be a typographical error of "2 mol %". Appropriate correction is required.
3. Claim 33 is objected to because of the following informalities: Claim 33, Line 2 recites "HJ" which appears to be a typographical error of "HI". Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
7. Claims 19-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoescheler et al (WO 2002/055028, see English language equivalent US 2004/0116550) in view of Schmitt et al (US 4,376,835).

Regarding claims 19-23, 25-27, and 29, Hoescheler et al discloses a glass filler material for use in dental applications comprising a polymer and oxide materials (Abstract, Pages 1-2, [0012]-[0019]). The reference discloses that the glass particles have a size of 0.6 microns to 3 microns and a refractive index of 1.49 to 1.55 (Page 1, [0018] and Page 3, [0042]), within the claimed ranges recited in claims 23 and 25, 27, 29.

The reference discloses the following oxide materials and amounts:

- a. Silicon dioxide, aluminum oxide in the amount from 69 wt % to 95 wt % (Page 3, [0040] and Table).
- b. Aluminum oxide and boron oxide in the amount from 0 to 3 wt % (Page 3, [0040] and Table).

- c. Zirconium oxide, yttrium oxide, hafnium oxide and lanthanide oxides from 5 to 35 wt % (Page 3, [0040] and Table).
- d. One or more of sodium oxide, lithium oxide, potassium oxide rubidium oxide in the amount from 0 to 3 wt % (Page 3, [0040] and Table).
- e. One or more of strontium oxide and barium oxide in the amount from 0 to 3 wt % (Page 3, [0040] and Table).

The following is a determination of the mol percent of the composition:

- a. Silicon oxide 76.1 to 96 mol % - based on 65 to 95 g with 30 g/mol yields 68.3-92.8 wt % of the composition within the amount disclosed.
- b. Boron oxide (34 g/mol) 0 mol % to 2.1 mol % - based on 0 to 3 g yields 0 to 2.15 wt % of the composition, within the amount disclosed
- c. Zirconium oxide (56 g/mol) 3.9 mol % to 15.0 mol % - based on 5 to 35 g yields 7 to 25 wt % of the composition within the amount disclosed.
- d. Lithium oxide (14 g/mol) 0 to 5.1 mol % - based on 0 to 3g yields 0 to 2 wt % of the composition, within the amount disclosed
- e. Strontium oxide (46 g/mol) 0 to 1.6 mol % - based on 0 to 3 g yield 0 to 2 wt % of the composition within the amount disclosed.

The determination of the mole % is made based on a total mass of the composition of components (a) to (e) on a gram basis, which yields a mass of the glass composition from 70 to 139 grams, a total of 2.2 to 3.6 total moles of the oxide materials.

It is noted that determined mol % amounts of (a), (b), (c), and (e) are within the claimed ranges recited for these compounds in claims 19, 20, 21 and 37. Furthermore, the amount of (e) determined above is within the amount recited in claims 22 and 26, (not over 2 mol %).

Regarding the amount of (d) recited in claim 19 (from 0.05 to 25 mol %), claims 20 and 37 (from 0.05 to 3 mol %) and claim 21 (from 0.05 to 2 mol %), it is well settled that where the prior art describes the components of a claimed compound or compositions in concentrations within or overlapping the claimed concentrations a prima facie case of obviousness is established. See *In re Harris*, 409 F.3d 1339, 1343, 74 USPQ2d 1951, 1953 (Fed. Cir. 2005); *In re Peterson*, 315 F.3d 1325, 1329, 65 USPQ 2d 1379, 1382 (Fed. Cir. 1997); *In re Woodruff*, 919 F.2d 1575, 1578 16 USPQ2d 1934, 1936-37 (CCPA 1990); *In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (CCPA 1974).

While the reference fails to exemplify the presently claimed composition nor can the claimed composition be "clearly envisaged" from the reference as required to meet the standard of anticipation (cf. MPEP 2 13 1-03), nevertheless, in light of the overlap between the claimed composition and the composition disclosed by the reference, absent a showing of criticality for the presently claimed composition, it is urged that it would have been within the bounds of routine experimentation, as well as the skill level of one of ordinary skill in the art, to use the composition which is both disclosed by the reference and encompassed within the scope of the present claims an thereby arrive at the claimed invention.

The reference does not disclose claimed limitation recited in claims 19 and 20, that the particles have an inner zone and an outer zone up to 1.5 microns, and wherein the mean concentration of alkali ions of the out zone relative to the mean concentration of alkali ions of

the inner zone is 10 % or less and the alkali ions of the inner zone do not significantly migrate to the outer zone. However, it is noted that in the prior art Schmitt et al discloses a composition comprising silica oxide, alkali and earth alkali oxides in which a depletion zone of alkali metals is obtained such that the concentration of alkali metals are different at the surface than at the core. i.e., the content of the alkali metals increases asymptotically from the surface region to the core region (Column 2, Lines 20-37 and Column 3, Lines 13-19). In the method disclosed by the reference the glass powders are fused together at a temperature of above 950 degrees, quenched and ground to have a particles size range from 1 to 20 microns and dealkalized with acids such as hydrochloric, sulfuric, and acetic acids (Column Lines 55-58). Additionally the reference discloses that the glass powder produced by this method has reduced water sensitivity while ensuring a sufficiently long processing period (Column 2, Lines 3-7).

Given that Hoescheler et al and Schmitt et al are both drawn to glass compositions comprising alkali oxides and given that Hoescheler et al does not explicitly prohibit other ingredients or method steps, in light of the particular advantages provided by the use and control of the glass compositions with zonal concentrations of alkali ions as taught by Schmitt et al, it would therefore have been obvious to one of ordinary skill in the art to modify the composition disclosed by Hoescheler et al with the zonal structures disclosed by Schmitt et al with a reasonable expectation of success.

Regarding claims 24 and 28, modified Hoescheler teaches all the claim limitations as set forth above. However, the reference does not explicitly disclose that the glass particles have a maximum particle size of 100 microns.

Schmitt et al discloses a glass filler composition comprising silicon and alkali oxides (Abstract). Furthermore, the reference discloses that the glass powders have a particle size of at least 0.5 microns and a maximum particle size of 150 microns (Column 4, Lines 16-29). The reference discloses that in order to achieve good mechanical properties a particle size distribution that is not excessively narrow is desired (Column 4, Lines 16-29).

Given that both Hoescheler et al and Schmitt et al are drawn to glass filler compositions comprising oxides, in light of the particular advantages provided by the use and control of the amount of glass filler particle sizes as disclosed by Schmitt et al, it would therefore have been obvious to one of ordinary skill in the art to modify the particle size distribution disclosed by Hoescheler et al as taught by Schmitt et al with a reasonable expectation of success

8. Claims 30-34 and 36-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoescheler et al (WO 2002/055028, see English language equivalent US 2004/0116550) in view of Poole (US 5,849,649) and Schmitt et al (US 4,376,835).

Regarding claims 30-34 and 36-37, Hoescheler et al discloses a glass filler composition and method of producing the glass filler material.

Regarding the glass filler composition, the reference discloses the following:

- a. Silicon dioxide, aluminum oxide in the amount from 69 wt % to 95 wt % (Page 3, [0040] and Table).
- b. Aluminum oxide and boron oxide in the amount from 0 to 3 wt % (Page 3, [0040] and Table).

- c. Zirconium oxide, yttrium oxide, hafnium oxide and lanthanide oxides from 5 to 35 wt % (Page 3, [0040] and Table).
- d. One or more of sodium oxide, lithium oxide, potassium oxide rubidium oxide in the amount from 0 to 3 wt % (Page 3, [0040] and Table).
- e. One or more of strontium oxide and barium oxide in the amount from 0 to 3 wt % (Page 3, [0040] and Table).

The following is a determination of the mol percent of the composition:

- a. Silicon oxide 76.1 to 96 mol % - based on 65 to 95 g with 30 g/mol yields 68.3-92.8 wt % of the composition within the amount disclosed.
- b. Boron oxide (34 g/mol) 0 mol % to 2.1 mol % - based on 0 to 3 g yields 0 to 2.15 wt % of the composition, within the amount disclosed
- c. Zirconium oxide (56 g/mol) 3.9 mol % to 15.0 mol % - based on 5 to 35 g yields 7 to 25 wt % of the composition within the amount disclosed.
- d. Lithium oxide (14 g/mol) 0 to 5.1 mol % - based on 0 to 3g yields 0 to 2 wt % of the composition, within the amount disclosed
- e. Strontium oxide (46 g/mol) 0 to 1.6 mol % - based on 0 to 3 g yield 0 to 2 wt % of the composition within the amount disclosed.

The determination of the mole % is made based on a total mass of the composition of components (a) to (e) on a gram basis, which yields a mass of the glass composition from 70 to 139 grams, a total of 2.2 to 3.6 total moles of the oxide materials.

It is noted that determined mol % amounts of (b), (c), and (e) are within the claimed ranges recited for these compounds in claims 30. Regarding the amount of oxide compounds recited in claim 37, it is noted that the amounts of oxides (a), (b), (c), and (e) disclosed the reference are with the amount recited in claim 37.

Regarding the amount of silicon oxide (a) recited in claim 30 (from 54 to 91 mol %) and (d) recited in claim 37 (0.05 to 3 mol %), it is well settled that where the prior art describes the components of a claimed compound or compositions in concentrations within or overlapping the claimed concentrations a prima facie case of obviousness is established. See *In re Harris*, 409 F.3d 1339, 1343, 74 USPQ2d 1951, 1953 (Fed. Cir 2005); *In re Peterson*, 315 F.3d 1325, 1329, 65 USPQ 2d 1379, 1382 (Fed. Cir. 1997); *In re Woodruff*, 919 F.2d 1575, 1578 16 USPQ2d 1934, 1936-37 (CCPA 1990); *In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (CCPA 1974).

Regarding the method of producing the glass filler, the reference discloses, the reference discloses heating to a temperature of 1550-2800 degrees C for 5 to 60 minutes (claims 31 and 31) as well as milling the particles to a size of 0.6 to 3.0 microns (Page 3, [0042] and [0051]-[0052])

The reference discloses all the claim limitations as set forth above, however, the reference does not disclose a method of mixing earth alkali oxides in the amount from 9 to 20 mol %. Poole discloses an analogous composition comprising (Column 3, Lines 23-31).

- a. silica oxide (44 to 68 mol %),
 - b. aluminum (2.0 to 7.5 mol %) and boron (15 to 30 mol %),
- for a total of 7 to 37.5 mol %

- c. alkali oxides such as lithium (3.0 to 11.5 mol %), sodium (2.5 to 5.0 mol %) and potassium (0.5 to 3.0 mol %) oxides, for a total of 6 to 20 mol %.
- e. alkali earth oxides such as calcium (0.5 to 4.0 mol %), magnesium (0 to 4.0 mol %) for a total of 0.5 to 8 mol %.
- f. zirconium (1.5 to 5.0 mol %) titanium (0 to 10 mol %), lanthanum (0 to 3.0 mol %) and yttrium (0 to 1.0 mol %) oxides, for a total of 1.5 to 19 mol %.

The total amount of alkali earth in the composition is 6 mol % to 22.5 mol % of the glass composition. Additionally, the reference discloses the method steps of mixing the composition in powder form, melting at a temperature from 1200-1350 degrees C for 1 to 3 hours and granulating the composition (Column 4, Lines 20-30).

Given that Hoescheler et al and Poole are drawn to glass composition, comprising silica alkali, alkali earth, and other metal oxides, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the amount of alkali oxides disclosed by Hoescheler et al with the amounts taught by Poole as it is well settled that where the prior art describes the components of a claimed compound or compositions in concentrations within or overlapping the claimed concentrations a prima facie case of obviousness is established. See *In re Harris*, 409 F.3d 1339, 1343, 74 USPQ2d 1951, 1953 (Fed. Cir 2005); *In re Peterson*, 315 F.3d 1325, 1329, 65 USPQ 2d 1379, 1382 (Fed. Cir. 1997); *In re Woodruff*, 919 F.2d 1575, 1578 16 USPQ2d 1934, 1936-37 (CCPA 1990); *In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (CCPA 1974).

Modified Hoescheler teaches all the claim limitations as set forth above. However, the reference does not disclose dealkalizing the glass powder with a dealkalizing agent

Schmitt et al discloses a composition comprising silica oxide, alkali and earth alkali oxides (Column 2, Lines 20-37). The reference discloses a method in which yields a depletion zone of alkali metals, such that the concentration of alkali metals are different at the surface than at the core, i.e., the content of the alkali metals increases asymptotically from the surface region to the core region (Column 3, Lines 13-19). Additionally the reference discloses that the glass powder produced by this method has reduced water sensitivity while ensuring a sufficiently long processing period (Column 2, Lines 3-7).

The reference discloses a method wherein the glass powders are fused together at a temperature of above 950 degrees, quenched and ground (Column 4, Lines 30-40) to have a particles size range from 1 to 20 microns (Column 4, lines 15-29). Additionally, the reference discloses a dealkalization method wherein acids such as hydrochloric, sulfuric, and acetic acids, recited in claim 33 are added to the powder (Column 55-58).

The reference discloses that the powders are separated from solution and thoroughly washed to leave the surface of the particles substantially free of alkali (Column 4, Lines 60-65 and Column 6, Lines 33-41). It is the examiner's this meets the claimed limitation that the composition is washed until the filtrate react neutral.

The reference discloses that the powder is dried at a temperature above 70 degrees C (Column 4, Lines 60-65). Although the reference does not explicitly disclose a time period, from the examples which disclose a time period of 2 hours, it is clear that the disclosed drying time meets the recited limitation of at least 30 minutes, recited in step (f) of claim 30. Furthermore,

although the reference does not explicitly disclose an upper bound, it would have been obvious to one of ordinary skill in art to dry the composition below the melting point of glass composition in order to avoid sintering of the glass powder.

Regarding the amount of glass powder, although the reference does not give an explicit range, from Example 1, where 100 grams of powder are slurried with 1000 grams of aqueous HCl it is clear that the amount of dealkalizing agent is used in excess of the amount of powder. The ratio of powder to dealkalizing agent determined from the reference is 1:10, within the claimed range of 1:5 to 1:1000 recited in claim 36.

Regarding the claimed limitation recited in claims 30 and 34, that the polar solvents such as water or ethanol are used to wash the glass particles, although the reference does not explicitly disclose that the washing fluid is a polar solvent, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize polar solvents to wash to powder as the acids as well as the alkali salts such as calcium disclosed by the reference are known to one of ordinary skill in the art to be soluble in polar solvents.

Given that both modified Hoescheler and Schmitt et al are drawn to compositions comprising alkali oxides used in dental compositions, and, given that Hoescheler does not explicitly prohibit other method steps, in light of the particular advantages provided by the alkalization method steps disclosed by Schmitt et al, it would therefore have been obvious to one of ordinary skill in the art to modify the method steps disclosed by Hoescheler with the dealkalization process disclosed by Schmitt et al with a reasonable expectation of success

Regarding claims 38-39, modified Hoescheler teaches all the claim limitations as set forth above. Additionally, teaches all the claim limitations as set forth above discloses that the glass filler is used in a polymerizable material comprising

- (a) 3 to 80 wt % of one or more cationically curable monomers (Column 2, Lines 27-39).
- (b) 3 to 90 wt % of the glass filler composition (Column 2, Lines 63-67).
- (c) 3 to 90 wt % of radio-opaque fillers (Column 2, Lines 27-39).
- (d) 0.01 to 25 wt. 5 of initiators, retarders, and/or accelerators (Column 2, Lines 27-39).
- (e) 0 to 25 wt % of auxiliary agents (Column 2, Liens 27-39).

It is noted that the amounts of cationic monomer (a) glass filer (b), radio-opaque filer (c) initiators (d), and auxiliary agents (e) disclosed by the reference are with the claimed ranges recited in claim 38. Furthermore, the reference discloses epoxide monomers, such as di(3-epoxycyclohexylethyl)methylphenylsilane (Column 9, Lines 50-67).

10. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoescheler et al (WO 2002/055028, see English language equivalent US 2004/0116550) in view of Poole (US 5,849,649) and Schmitt et al (US 4,376,835) as applied to claims 30-34 and 36-39 above and further in view of Hecq et al (US 5,093,196).

Regarding claim 35, modified Hoescheler teaches all the claim limitations as set forth above. However, the reference does not disclose that dealkalinizing is performed at temperature from about 50 degrees C to 200 degrees C.

Hecq et al discloses a process wherein dealkalinization is performed at temperatures below 300 degrees C (Column 6, Lines 55-61). The reference discloses that at this temperature as it discourages replenishment of the alkali ion population in the surface layers of the glass as well facilitates subsequent rapid cooling of the glass (Column 6, Lines 55-61).

Given that both modified Hoescheler and Hecq et al are drawn to compositions comprising alkali oxides, and, given that Hoescheler does not explicitly prohibit other method steps, in light of the particular advantages provided by the dealkalinization at temperatures disclosed by Hecq et al, it would therefore have been obvious to one of ordinary skill in the art to modify the method steps disclosed by Hoescheler with the dealkalinization temperatures disclosed by Hecq et al with a reasonable expectation of success.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEXANDER C. KOLLIAS whose telephone number is (571)-270-3869. The examiner can normally be reached on Monday-Friday, 8:00 AM -5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (571)-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. C. K./
Examiner, Art Unit 1796

/Vasu Jagannathan/
Supervisory Patent Examiner, Art Unit 1796